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XXXIII.—*Amphipodous Crustaceans. On the Genera Hyale and Anonyx and a new Species of Probolium.* By the Rev. T. R. R. STEBBING, M.A.

[Plates XVIII. & XIX.]

Hyale Nilssoni and *Hyale Lubbockiana*.

The late Axel Boeck, in his 'Crustacea Amphipoda borealia et arctica,' unites under Rathke's genus *Hyale* the *Allorchestes* of Dana and the *Nicea* of Nicolet. Among the generic characters, he states that the telson is short, thick, and divided. Mr. Spence Bate, on the other hand, in his important and useful British-Museum Catalogue of Amphipodous Crustacea, keeps the three genera distinct—describing *Allorchestes* as having "the telson single," *Nicea* as having the superior and inferior antennæ subequal, "the rest of the animal generally resembling *Allorchestes*, except the telson, which is deeply cleft (or double?)," and finally assigning to *Hyale* a simple telson, though figuring that of *Hyale pontica* as cleft or double. At the same time Mr. Spence Bate expresses his own inclination to classify Rathke's *Hyale* near to *Nicea* of Nicolet, though, as he had not himself seen a specimen of *Hyale*, he felt bound to adopt Dana's arrangement of the genus in the subfamily *Lysianassince*. In the 'British Sessile-eyed Crustacea,' by Messrs. Bate and Westwood, the genus *Allorchestes* is stated to have "the telson single;" but there again, by a curious

discrepancy, the figure of *Allorchestes imbricatus* shows the telson divided. Specimens, moreover, from Torbay of a species in other respects agreeing with *Allorchestes Nilssoni* undoubtedly have a divided telson. There is, indeed, a suspicious similarity between the figures in the Museum Catalogue of *Allorchestes Nilssoni* and *Hyale pontica*; but whether these two are identical or not, it is pretty clear that Axel Boeck was right in reducing the three genera *Nicea*, *Allorchestes*, and *Hyale* to one, the name *Hyale* being retained in right of priority.

But if Axel Boeck is right in uniting the genera, he is undoubtedly wrong in confounding the two species *Allorchestes Nilssoni* and *Nicea Lubbockiana*. The two are well discriminated in Mr. Spence Bate's Catalogue, to which Boeck himself refers. The Catalogue, however, describes only the male of *Allorchestes Nilssoni*, and only the female or young of *Nicea Lubbockiana*; this is the case also with the subsequent work entitled 'British Sessile-eyed Crustacea.'

Both of the species, which should now be called respectively *Hyale Nilssoni* and *Hyale Lubbockiana*, seem to have an affection for tufts of *Polysiphonia* and other finely branched weeds; the young forms especially may be taken from these tufts in great numbers. Both old and young of *H. Nilssoni* are very agile, and have the faculty, not apparently shared by their neighbours, of rising on their feet and springing away in a very abrupt manner. Well-grown specimens may be taken in a state of suspended animation, rolled up in the green weeds (*Enteromorpha*) which coat the rocks at high-water mark. The adult male in both species is distinguished chiefly by his superior size generally, and by the largeness of the second gnathopods in particular. In the young the two pairs of gnathopods are closely alike and nearly of the same size, the second pair having in this respect a little the advantage. This observation applies to the females up to an age when they are already prolific, at any rate in the case of *H. Nilssoni*, though subsequently the females of that species have gnathopods agreeing in shape with those of the full-grown male. The second gnathopods are then much larger than the first, with hands about two fifths of the size of the bulky rounded claspers carried by the male.

The two species are so similar in general appearance, that it may be convenient to notice those points in which they more or less decidedly differ. In *Hyale Nilssoni*, by the extent of the flagellum, the lower antennæ are considerably longer than the upper. The lower antennæ often have the last joint of the peduncle ornamented beneath by three rows of cilia, which are not to be found in the corresponding portion

of *H. Lubbockiana*. This latter species has the two pairs of antennæ very nearly equal, although in the full-grown male the lower antennæ are noticeably longer than the upper. Here the first gnathopods have only two or three hairs on the hinder margins of the wrist and hand, whereas in *H. Nilssoni* these margins are prettily fringed with hairs springing from bead-like points of insertion, with the wrist-margin fuller and more rounded. It must, however, be observed that in the largest specimens of both sexes these limbs agree closely with the figure given by Messrs. Bate and Westwood: the fringes have almost disappeared; the hand is widened near the palm; and a re-entering angle breaks the roundness of the hinder margin of the wrist. The second gnathopods have the following minute marks of difference:—In *H. Nilssoni* the apex of the finger closes down into the extremity of the palm, which is well defined by the angle (less and less obtuse with advancing age) which it forms with the margin of the hand, this margin bearing two or three hairs very near to the angle just mentioned; in the allied species the palm is defined by two spines, and the hairs on the margin of the hand occupy a small indentation about the centre of it, while the wrist is a little more produced backwards. It is worthy of notice that in the adults of both species the metacarpus of the second gnathopods meets the hinder margin of the hand, thus occupying the space which in the young belongs to the hinder margin of the wrist. In the case of *H. Lubbockiana*, if there could be any doubt that these two forms of the second gnathopod belong to the same species, it would be set at rest by a specimen in my collection, which obligingly exhibits both forms on the same animal—the result, it may be presumed, of arrested development in the smaller limb of the pair.

In *H. Lubbockiana* the coxæ of all the legs and the thighs of the last three pairs are crenate, with minute hairs in the angles; in the other species, though the hairs are present, the crenature is wanting or inconspicuous.

The foregoing differences have been, we must admit, sufficiently minute, and requiring tolerably careful observation with a good light; but a very transient glance at the pereopoda of the two species will suffice to remove all hesitation as to their perfect specific distinctness. It will not be necessary to do more than describe the last in each series, as all the five pairs in each species have the same general character. In *H. Nilssoni*, then, the metacarpus, wrist, and hand of the last pereopod are comparatively slender. The metacarpus is armed behind with four spines, and two in front, its distal extremity being conspicuously fringed with a set before and behind. The

wrist has the hinder margin smooth, and is shorter than the metacarpus, but is otherwise like it. The hand has spines along the front margin, and a little tuft of hairs in the centre of the margin behind, with some long ones projecting from its point of junction with the finger.

In *H. Lubbockiana* all these joints are stout. The metacarpus has two short spines standing stiffly out from its hinder margin, and an inconspicuous one at the distal end, with two very small pairs on the front margin. The wrist has two pairs of short spines in front. The hand behind is continuously curved and free from hairs or spines; its anterior margin presents three sections—the first armed at the end furthest from the wrist with a stout spine, this spine terminating in a very minute hook; the next section, besides two or three small setæ, carries that which is the most striking feature of this species, a spine twice as long and twice as thick as the one just mentioned, conspicuously hooked at the end, and serrated along the lower margin; it is movable, and can be brought into contact with the large scimitar-like serrated finger; near to the junction of the hand and finger there is another spine, a copy of the preceding one on a far smaller scale.

It was noticed above that *Hyale Nilssoni* has and exercises great powers of leaping; and we might wonder that *Hyale Lubbockiana*, so similar in size and general structure, living apparently in precisely the same environment, should neglect or not possess so effective a resource for escaping from enemies. But a consideration of the spines just described seems to indicate that its safety is consulted by holding fast, while its neighbours have recourse to the opposite expedient of suddenly skipping away. Of the three spines in question, the central and largest would seem a development very difficult to explain, if its two companions did not show us actual gradations leading up to it from the ordinary simple spine—those at the extremity of the wrist supplying yet another intermediate step, and making it clear by one more example how small the changes may be by which very considerable and striking revolutions may be produced in the forms and habits of living creatures. With *Hyale Nilssoni* one might easily be tempted to make separate species for the elder and younger forms, did not a well-graduated intermediate series give very fair evidence of the family tie between them.

Anonyx serratus, Boeck.

Among the species of *Anonyx* described by Messrs. Bate and Westwood, two will be found closely resembling one

another, viz. *Anonyx Edwardsi* and *Anonyx minutus*. The former appears, however, to be identical, not with the original *Anonyx Edwardsi* of Kröyer, but with the *Anonyx serratus* of Boeck; and Boeck, in his subdivision of the genus, uniting this species with *Anonyx pinguis* and *Anonyx minutus*, has given them the generic name of *Orchomene*. A rearrangement of the specific names was doubtless needed; but the use of splitting up a genus, itself so closely allied to its neighbours *Lysianassa*, *Callisoma*, and others, is less obvious. It will, indeed, be a hard necessity for the study of sessile-eyed Crustaceans, if it is forced to accept the principles of classification worked out with so much industry by Axel Boeck, largely based as they are upon differences in the organs of the mouth. How prone authors are to register unimportant differences as characters that make for generic or specific distinction is rather amusingly illustrated in this very genus *Orchomene* of Boeck. In describing the genus he says, "epimerum quintum altius quam latius:" yet of *O. pinguis* he says, "epimerum quintum eadem altitudine ac latitudine," of *O. serrata*, "epimerum quintum latius quam altum," of *O. umbo*, "epimerum quintum in medio gibberum magnum eminens;" so that only the two remaining species, *O. minuta* and *O. Gössii*, have the generic "epimerum quintum altius quam latius." When, moreover, the three descriptions of the species of *Orchomene* or *Anonyx* named respectively *pinguis*, *serratus*, and *minutus* are compared throughout, it will be found that they consist entirely of characters which are exceedingly liable to vary with age and sex. The same remark will apply to the *Anonyx Edwardsi* and *Anonyx minutus* described in the 'British Sessile-eyed Crustacea.' Of these two, the former is the female, the latter almost certainly the young of *Anonyx serratus*—the adult male now to be described having apparently hitherto escaped observation, unless, which is highly probable, it be the *Anonyx (Orchomene) pinguis* above mentioned.

The following are its characters. The eyes are large, reniform, and red. The upper antennæ have the first joint thick, the two following much shorter, and sloping downwards at the top. The first articulation of the flagellum is nearly as long as all the rest of it. It has two rows of hairs on the inner side, and, also on the inner side, the secondary appendage with its first articulation long, but not so long as that of the flagellum. The lower antennæ have a peduncle of short articulations, followed by a flagellum considerably longer than the whole animal, consisting of about seventy articulations gradually increasing in length and tenuity towards the end, and each surmounted by the *calcola* which has been described

(Brit. Sess. Crust. vol. i. p. 86) as found on the antennæ of *Lysianassa longicornis*, and (Ann. & Mag. Nat. Hist. ser. 4, vol. xv. Jan. 1875) also on those of *Bathyporeia pilosa* (see also Brit. Sess. Crust. vol. i. p. 92). The anterior lateral angle of the head is much produced and rounded. The first gnathopods are short and stout. The hand, which is widest at the base, is longer than the wrist; the triangular wrist is slightly produced behind at the base of the hand. The second gnathopods are long and very slender, the thighs being equal in length to hand, metacarpus, and wrist put together. For the rest, these limbs and the last three pairs of walking-legs are so fully described in the 'British Sessile-eyed Crustacea,' under the two species already cited, that nothing need be added. Of the two intermediate pairs, it is said under *Anonyx Edwardsi* that they are small, under *Anonyx minutus* that they are tolerably robust. Both statements may be accepted together, especially as from the figure of *A. Edwardsi* it would seem that the metacarpus, which is the robust part of the limb, had not been observed in the specimens described under that name. It is the custom of these animals to keep both gnathopods and the first two pairs of walking-legs, together with the long lower antennæ, closely hidden between the deep coxæ, so that in general their true characters can only be observed by dissection. The third segment of the pleon has the hinder margin very slightly serrated; the hinder margins of the two following segments are partially serrated. The first of these has a depression in the upper margin near the base, which passes beneath the preceding segment; its hinder margin is gibbous. The fifth segment has the upper margin curved and passing under that of the fourth; its hinder margin likewise presents a gibbosity. The sixth segment is squared above like the corresponding portion of *Lysianassa longicornis*, the whole tail-piece of which bears a marked resemblance to that of the animal now under discussion. The telson appears to be more or less cleft. The last pair of caudal appendages have the peduncle short and stout, the branches subequal, the lower being rather the longer, both adorned on the upper serrated margins with long cilia and armed below with short spines.

The same dredging which supplied the specimen now described yielded numerous specimens in which no differences from it could be detected, except that they were in various degrees smaller, that the last caudal appendages were not plumose, and that they did not possess the long calceola-bearing flagella of the lower antennæ. On the other hand, they *did* exhibit the same shape and ornamentation of both pairs of gnathopods; the upper antennæ, with their inner

brushes, were the same; the walking-legs were the same; the pleon, with the exception already mentioned, was the same.

Of Boeck's three species, only *Anonyx (Orchomene) pinguis* is said to have setose branches to the last pair of caudal appendages. This species, together with that called *minutus*, is said to have red eyes, while to *serratus* black ones are assigned. Messrs. Bate and Westwood, however, say of their *Anonyx Edwardsi*, which is the *Orchomene serrata* of Boeck, that the eyes are red in the young, but become black in the adult animal. No doubt the colour is variable. Certainly in *Amphithoë littorina* the eyes, which these authors state to be black, are not unfrequently red.

As to the upper antennæ, Boeck says of the first joint of the peduncle that it is in *O. pinguis* very thick, in *O. serrata* pretty long, in *O. minuta* short and thick; while he compares the length of the first joint of the flagellum respectively to that of five or six, of two or three, and of three of the following articulations united. The other distinctions are of a similar character, relating almost exclusively to differences of dimensions. These cannot be relied on in comparing animals in other respects nearly alike, for the simple reason that in the growth of all living creatures the proportions of various parts are liable to change, and are besides very frequently different in the two sexes. Thus the head of a tall man may be one eighth of his whole height, but the head of a child will be a much larger fraction of its complete stature.

The contention here advanced, that the long lower antennæ and setose final pleopoda are in some cases characters of the male sex, is supported by the opinion which Messrs. Bate and Westwood express to the same effect in regard to a specimen of *Phoxus plumosus* (Brit. Sess. Crust. vol. ii. p. 527). It may also be considered certain that where animals are only to be distinguished by the length of the lower antennæ, those with the shorter antennæ are the females or juniors, antennæ of an intermediate length, without calceolæ, indicating a male not full-grown. Such a specimen has presented itself among others of *Anonyx serratus*.

If this rule be accepted, and the uncertainty of specific distinctions grounded on proportion of parts or setose adornment be recognized, the opinion here advocated (that the *Anonyx* or *Orchomene* variously called *pinguis*, *serratus*, or *minutus* is the one species *Anonyx serratus*) will have a good chance of prevailing. But the same data seem capable of further extension. Already Lilljeborg has shown that the *Anonyx ampulla* and *A. longipes* of the 'British Sessile-eyed Crustacea' are both of them *A. longipes*, the so-called *A. ampulla* (which has

comparatively long antennæ) being the male. It may be open to question whether *Lysianassa atlantica* may not be the young of *Lysianassa longicornis*; but any one who will read attentively the accounts given by Messrs. Bate and Westwood of *Urothoë marinus*, *U. brevicornis*, and *U. elegans* in the light of what has been said of the species of *Anonyx* and (in a former paper) of the species of *Bathyporeia*, will scarcely escape the conviction that these three descriptions belong to one species. The variation of colour exhibited by *Urothoë elegans* is not uncommon, as in *Iphimedia obesa*, *Calliope leviuscula*, and, to a striking extent, in *Cyrtophium Darwini* *.

It should be added that the white integument of the various specimens of *Anonyx* discussed in this paper displayed similar markings—markings very indefinite in shape, but many of them angular and looking like short disconnected scratches. The abrupt junction of the long narrow flagellum to the broad end of the peduncle in the lower antennæ of the full-grown male is also worthy of notice. In the other specimens, the peduncle being itself comparatively narrow, there was no special abruptness in its junction with the flagellum.

Probolium Spence-Batei, n. sp.

This pretty little species was taken in December of last year from a tidal pool at Goodrington, in Torbay. The solitary specimen obtained was a female with eggs. It measured about one tenth of an inch in length. It has all the characters of the genus *Probolium* of Costa, which answers to the genus *Montagua* of Spence Bate. The specific name is given in honour of this latter author, who has done so much to make known the curious varieties and varied beauty of Sessile-eyed,

* An extract from the 'Comptes Rendus' for Jan. 3, 1876, p. 76, in the last number of the 'Annals' (March 1876), shows me that the sexual character of the long antennæ in *Urothoë* has been already observed by M. A. Giard. In an interesting notice of the commensalism of this crustacean with a sea-urchin, M. Giard draws the inference, in regard to the species named in the 'British Sessile-eyed Crustacea,' that one sex only has been described for each of the known types, that *Urothoë Bairdi* and *Urothoë elegans* must be regarded as representing male individuals, whilst *Urothoë brevicornis* and *Urothoë marinus* are, on the contrary, figured from the female sex.

From the plumosity of the terminal caudal appendages, I had myself been inclined to class *Urothoë marinus* as a young male. But possibly this plumosity may depend on the time of life, and not on the sex. The relative sizes of the specimens, as given in the *text* of the British-Museum Catalogue, would then suggest that *U. marinus* is an adult female, *U. brevicornis* the undifferentiated young. In a solitary specimen obtained from Goodrington sands, Torbay, the eyes approach the reniform shape assigned to those of *U. elegans*, while the antennæ agree with those of *U. marinus*.

and specially of Amphipodous, Crustaceans. It is much to be wished that his Museum Catalogue of Amphipodous Crustaceans were supplemented by a similar volume on the Isopods of the world at large.

In *Probolium Spence-Batei* the upper antennæ are very slightly the shorter, the middle articulation being the longest of the three that form the peduncle, the last articulation of the peduncle being rather shorter than the first of the flagellum. In the lower antennæ the last articulation of the peduncle is the longest, narrowing rather sharply towards the distal end; its predecessor is somewhat shorter and thicker. The flagella of these, as of the upper antennæ, are slight, with about five articulations. The eyes are black, of moderate size. With some difficulty the incised edges of the first coxæ may be seen through the partially transparent second coxæ that overlie them. The first and second gnathopods are alike, except that the second pair have the advantage in point of size. Of these limbs, the hands are, roughly speaking, oblong, with a tendency towards an ovate shape at the base; the front margin is gently curved, the hinder margin very slightly sinuous. The palm is at right angles to these margins, having a very slight curve, but with the angle well rounded off where it meets the hinder margin, and surmounted by two short spines; along a line which runs quite straight from these spines to the insertion of the finger are set at intervals some four or five very delicate spines; the exceedingly delicate arc, of which this line forms the chord, is finely serrated or pectinate, the appearance presented being that of finely engraved lines parallel to one another, of which four or five occupy each of the spaces between the spines just mentioned at the edge of the circumference, but do not reach to the chord. The wrist is produced along the lower margins, and surmounted at the blunt apex by two or three cilia.

The telson is boat-shaped, the margin rising highest near the middle of each side. The rami of the last pleopoda were missing; their peduncles seemed rather peculiar in not being completely tubular, but open above at the distal end. The penultimate pleopoda have the branches slight, the inner being the longer of the two. In the antepenultimate pleopoda the peduncles are very long; the rami long and slender, equal to one another, not so long as the peduncle, the inner branch bearing three very small spines.

In colour there is nothing to notice but some orange-red dots scantily sprinkled on the third coxæ, and rather thickly on the fourth and broadest; a few small and faint ones could also be discerned on the thighs of the third pair of pereopoda.

EXPLANATION OF THE PLATES.

PLATE XVIII.

- Fig. 1. Hyale Nilssoni*, young male. 1 *a.* Lower antennæ. 1 *b.* Gnathopods. 1 *d.* Last pereopod. 1 *f.* Portion of pleon. 1 *c.* Gnathopods of younger forms, retained in the female even when spawning. 1 *e.* Pleon of ditto. 1 *g.* Gnathopods of fully developed female. 1 *h.* First gnathopod of fully developed male.
- Fig. 2. Hyale Lubbockiana*, male. 2 *a.* Gnathopods of male. 2 *c.* Last pereopod. 2 *d.* Pleon. 2 *b.* Gnathopods of young.

PLATE XIX.

- Fig. 3. Anonyx serratus*, male. 3 *a.* Antennæ. 3 *b.* First gnathopod. 3 *c.* Second gnathopod. 3 *d.* First pereopod. 3 *e.* Pleon.
- Fig. 4. Probolium Spence-Batei*. 4 *a.* Antennæ. 4 *b.* Gnathopods 4 *c.* Pleon.

XXXIV.—*Notes on Chrysochloris Trevelyani*. By Dr. ALBERT GÜNTHER, F.R.S., Keeper of the Zoological Department, British Museum.

[Plate XX. figs. A & B.]

In the 'Proceedings of the Zoological Society' for 1875, p. 311, I described and figured a large species of Golden Mole from British Caffraria (*Chrysochloris Trevelyani*) from a single flat skin. As the discoverer, Mr. Herbert Trevelyan, shortly afterwards returned to South Africa, I begged him to obtain more and better-preserved examples, entire if possible, or to procure at least the skull. In this he was so far successful as to send home flat skins of two adult and one younger specimen, and three skulls, one of which is in a fragmentary condition. The skins of these examples differ from the typical specimen in the fur being of a greyish brown colour, with scarcely any gloss on it, the under-fur being grey. This difference in the colour is probably due to the season of the year at which the specimens were obtained, those sent last having been killed in the course of the summer.

The skull represents one of the most singular forms in the division of Insectivorous mammals; and although its most prominent and characteristic features are indicated in the other species of *Chrysochloris*, it differs widely from their skulls as regards general form*. From the occipital crest forwards the skull is nearly equally narrow and elongate, the occipital region behind that crest being abruptly truncated, vertical—yet

* For comparison of the descriptive detail I refer to Prof. Mivart's excellent account of the skull of *Chrysochloris*, in 'Journal of Anatomy and Physiology,' ii. pp. 130 *et seqq.*